Quasi-Resonant DC-DC Converters with Reduced Body Diode Loss

ABSTRACT OF THE DISCLOSURE

Buck converters having a resonant inductor Lr, resonant capacitor Cr, and synchronous switch Q3 that together provide reduced switching loss and soft switching. In operation, the resonant inductor Lr is charged during a time period A. Then, Lr is freewheeling and provides current to an output inductor Lo. Then, Q3 is turned OFF, and energy from the resonant inductor Lr charges the resonant capacitor Cr. Finally, energy from the resonant capacitor Cr is provided to the output inductor and load. The output power can be adjusted by phase control of the operation of switch Q3. In alternative embodiments, the circuit has a pair of coupled inductors L1 L2 or an isolation transformer 40. The coupled inductors have a polarity selected so that the output voltage is reduced, thereby allowing top switch Q1 to have a greater duty cycle. These circuits feature no body diode loss in the switch Q3.